# ASTHMA

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# *Asthma*

Asthma is one of the most significant chronic illnesses of childhood. Approximately 10% of the students may at some time have signs and symptoms of asthma. It is one of the leading causes of school absences. Asthma can cause considerable psychosocial and financial stress within a family.

## I. Definition

Asthma is a lung condition that causes repeat episodes of breathing problems. These episodes or attacks are characterized by a tightening in the airway that causes the windpipes to narrow, allowing less air to pass through. In the later stages of an episode, the airways may swell and produce more mucous than normal, hence blocking even more air flow. Students with asthma often have sudden or acute attacks of breathing problems, such as coughing, wheezing, tightness in their chest, and shortness of breath. Wheezing is a high-pitched sound that individuals with asthma sometimes make when they breath air into the lungs and especially when they exhale.

The cause of these attacks is a sensitivity of the student's airways that results in an overreaction to certain "triggers." Triggers can include numerous physical, chemical and pharmacologic agents, such as allergens, respiratory infections, cold air, and exercise. Common triggers vary from individual to individual.

Although the word attack (which implies a sudden, unexpected onset) is used in relation to asthma, episodes usually take place slowly and can be recognized. An asthma attack has these three factors.

- The first is the contraction of the involuntary muscle surrounding the airway, which is known as bronchospasm. Bronchospasm causes airway obstruction. It can be reversed quickly by bronchodilators.

- The second is inflammation, edema, or swelling that results from the release of chemicals by the cells in the airway. The swelling narrows the airway. Swelling may last for weeks; therefore, medications such as corticosteroids may be used to reduce the inflammation. Corticosteroids, when used early in a serious asthma episode, may speed its conclusion and prevent recurrence.

- The third is excessive, thick mucous production that may occur during an asthma episode. The mucous further narrows the airway. Corticosteroids may assist in reducing the mucous. Deep coughing may help expel the mucous when the episode is ended.

It is important to understand that symptoms of asthma can be mild, severe, or fatal. Therefore, persons caring for the student with asthma must have the knowledge and skill to adequately support the student.

## II. Management

School-based management of asthma has become necessary and more complex with the increased awareness of the school's responsibilities and increased emphasis on aggressive preventive care. Effective management of asthma at school is critical because it can:

- Minimize environmental triggers
- Promote a supportive learning environment
- Promote optimal school performance by controlling symptoms with medications and recognizing side effects, thus reducing absences
- Provide the necessary support in the event of an emergency
- Enable students to achieve full participation in physical activities

A complete management plan should be written for each student with asthma and should be created by the student's primary health care provider in collaboration with the family and school health case manager. The plan should include:

- Environmental control measures
- Administering medication
- Monitoring of asthma and documentation
- Emergency care
- Physical education and sports adjustments
- Asthma education (student, family, school personnel)

### A. Environmental Control

Environmental control measures should eliminate or minimize identified allergens or irritants that trigger asthma. Potential triggers may include outdoor triggers (ragweed, grass, pollen, mold), and/or indoor triggers (mold and house dust, chalk dust, components which include animal dander, dust mites, and cockroach droppings). Potential triggers may be avoided by staying indoors, reducing mold with dehumidifiers, using air conditioners, using indoor cleaning devices, vacuuming regularly, and avoiding such indoor irritants as heating stoves, strong odors and sprays, and air pollutants (e.g., ozone, sulfur oxide, and tobacco smoke). **Therefore all school buildings should be "smoke free."**

### B. Administering Medication

Schools should provide safe and ready access to medications for the student with asthma.

The goal of medication therapy for asthma is to open the airway and reduce swelling and mucous production. It is critical to recognize that failure to respond or an inadequate response to medication is a major risk factor for morbidity and mortality during an asthma attack. Therefore, an inadequate response to a medication or a

failure to respond to medication should be reported to the lawful custodians and/or physician so that the student's treatment can be re-evaluated. Medications for asthma include two types of medications: relievers and preventers.

Relievers are bronchodilators that relax or open the airway. The most common is Albuterol, also known as Proventil or Ventolin. These medications are given with a flare up of asthma and are also used prior to exercise. Bronchodilators are usually delivered to the airways using an inhaler (puffer) or nebulizer (See Asthma Medication Procedures at the end of this section.) Occasionally, some of these medications will be given by mouth in the form of pills or syrups.

Preventative medications include Cromolyn (Intal) and inhaled steroids (Vanceril, Beclovent, Aerobid, Azmacort, and others). These medications are given on a regular basis often for weeks or months at a time. Because these medicines are given so regularly, they are typically administered outside of regular school hours. However, it should be noted that Cromolyn is sometimes used in school for students with exercise induced asthma and may be administered more frequently during school hours.

The following is a list of asthma medications and their side effects:

| **Asthma Medication** | **Side Effects** |
|---|---|
| Bronchodilators | *restlessness, weakness, anxiety, fear, tension, sleeplessness, tremors, convulsions, dizziness, headache, flushing, loss of appetite, pallor, sweating, nausea, vomiting, muscle cramps* |
| Cromolyn | *occasional coughing with inhalation of medication* |
| Inhaled Steroids | *dry mouth, hoarseness, occasional coughing with inhalation of medication, thrush (candidiasis of the mouth)* |
| Steroids given by mouth | *stomach upset, increased appetite, weight gain, rounding of the face, fluid retention, mood alteration, increased sweating, headache, itching, and peptic ulcer* |

## C. Monitoring the Student with Asthma

The use of a peak flow meter is an important part of asthma care that allows for earlier detection of asthma flare-ups (procedure follows). Most students can be taught to use a peak flow meter. The student may use the peak flow meter when he/she is having an asthma episode, at prescribed intervals throughout the day, or before and after exercise. The measurement from the peak flow meter helps establish a student's baseline. Then decisions to administer medications can be made on any changes from the student's baseline peak flow measurement.

## D. Emergency Care

Clear instructions on how to handle emergencies, including evaluation and treatment, should be included in school policies. The best management of an acute asthma episode or asthma flare up is prevention and early treatment to reverse the symptoms. Management should include:

- A written action plan by the physician on how to manage an asthma episode and should be integrated into the Individualized Health Care Plan
- Written documentation of early indicators of an impending asthma episode in the individual student (such as a deteriorating peak flow measurement)
- How to communicate with the lawful custodians and/or physician to notify them of a serious deterioration in the student's condition
- Removal of any allergic irritant that may trigger an asthma episode from the environment or removal of the student from the environment.

Management of the student having an acute asthma episode includes peak flow meter measurements to determine how well the student is breathing and medications as prescribed to rapidly open the student's airway. The physician and/or lawful custodian should be notified immediately in the case of a severe asthma episode or if the medications do not improve the student's condition. Essential to the treatment and management of acute asthma episodes is close monitoring of the student's condition and response to medications.

## E. Physical Education and Sports Adjustments

Some students may have exercise-induced asthma (EIA), which occurs after the onset of vigorous exercise or activity. This can occur in all asthma patients. These students will need inhaled medications prior to exercise. Therefore, medication should be available and convenient. The goal of managing EIA is to allow students to participate in any activity they choose without asthma symptoms. Consequently, teachers and coaches need to be aware that the student may need medication before participating in exercise or vigorous activities.

### F. Asthma Education

Education of the patient or student is crucial to managing asthma. The student and his/her family need to be aware of what asthma is, what the signs and symptoms are, what triggers an asthma episode, treatment, optimal use of the peak flow meter, and how to evaluate response to treatment. Not only does the student and his/her family need to be aware of these points, but it is essential that the school is also aware of them. To provide comprehensive management of asthma in students, there must be collaboration between the student, the family, the health care provider, and the school. Collaboration can only be accomplished through communication. The student's baseline (peak flow measurements, response to medications, and frequency and severity of asthma episodes) and any changes in his/her baseline must be communicated among the school, home, and physician to support optimal functioning of the student.

## III. Summary

In summary, asthma is a major illness within our schools. It is important that students with asthma have consistent care. This care should be provided by a coordinated program that is planned by family, school, and physician working together.[1]

## Peak Flow Meter

### I. Purpose

A peak flow meter measures the amount of air that can be exhaled from the lungs in a single breath.

It is used to improve the ability to predict the onset of and to assess the severity of asthma, to detect the small changes in air flow that occur at the start of an asthma attack, to identify exercise-induced asthma and to monitor the need for or the response to prescribed medication.

The peak flow meter is useful in the management of the student with asthma because this device can detect early changes in the bronchioles. Baseline data for the student must be obtained. The student's normal peak flow should be recorded so that comparisons can be made.

Peak flow results can be used by the physician to determine the plan for treatment and by the school nurse to evaluate the plan for treatment. Also, peak flow results can be used to assess the student's respiratory status.

### II. Suggested Settings

Peak Flow Meter measures can be done in any school location but ideally should be in the health office which provides for student privacy. If taking peak flow measures in other areas of school, privacy and a non-stressful situation must be considered.

### III. Special Equipment

1. Peak flow meter (various brands are available)
2. Mouthpiece (plastic or disposable)

### IV. Suggested Personnel and Training

An adult with proven competency-based training in appropriate use of the peak flow meter and interpretation of results can perform this procedure safely and effectively. Students may also be taught how to use a peak flow meter although adult supervision is always recommended. School personnel who have regular contact with the student should receive general training, which covers the students' special health care needs and potential problems, as well as how to obtain assistance if problems occur or are eminent.

The basic skills checklist included at the end of this discussion can be used as a foundation for competency-based training in appropriate techniques. It outlines specific procedures step-by-step. Once skills have been mastered, the completed checklist serves as documentation of training.

## V. Individualized Health Care Plan: Issues for Special Consideration

Each students' Individualized Health Care Plan must be tailored to individual needs. A sample Individualized Health Care Plan and Anticipated Health Crisis Plan are found in Appendix A. These may be copied and used to develop a plan for each student. The following sections cover procedures for use of an inhaler. It is essential that the procedure be reviewed before writing the Individualized Health Care Plan.

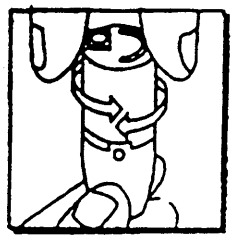
For a student who requires the use of an asthma inhaler, the following points should receive particular attention:

- Medication and possible side effects
- Adequate supply of medication contained in inhaler
- Documentation of episodes requiring use with times of use carefully monitored
- Effect of inhaler once used - can be self reported by student if properly taught

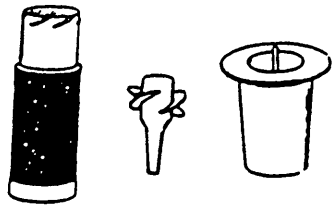
## VI. Possible Problems

| Observations | Reason/Action |
|---|---|
| Student unable to manipulate device or coordinate breathing - use spacers or extension tubes | *Provide add-on equipment to facilitate maximum action of medication in lungs* |
| Adverse effects of prescribed drugs and dangers of overuse | *Instruct in use only when needed and using medication as a substitute for avoiding symptom-producing allergens* |
| Drugs used frequently but being less effective | *Student/lawful custodian should report any changing reaction to a drug in order to reassess appropriate medical regime and avoid an asthmatic crisis* |
| Variance in prescribed medical regime | *Avoid purchase of generic medications or over-the-counter preparations as dosages may be different with possibility of duplicate medications being administered or dosage being lower than prescribed* |

**Examples of Different Asthma Inhalers**



Rotohaler



Spinhaler

AeroChamber

In general the procedure is the same for all inhalers. Some delivery systems will require the use of a capsule and some will use a medication cartridge.

## VII. Asthma Care Zone For Peak Flow Meter Monitoring

The asthma care zone system is a color system to monitor the breathing of a person with asthma. The colors indicate which procedure to perform.

**Green Zone**
**(Indicates relative stability)**

With reasonable amounts of medicine, students with well-controlled asthma should be maintained within 90 to 100 percent of their best peak flow value.

No change in medicines may be needed at this level.

If the results from a student's tests show proven stability in this zone, tapering certain medicines may be considered.

**Yellow Zone**
**(Indicates trouble)**

Early signs of an asthma attack are either detected or confirmed by peak flow fluctuations in a range from 50 to 90 percent of normal.

At the highest ranges of this zone (70 to 90 percent), wheezing and coughing may not be noticeable either with the use of a stethoscope or an unaided ear. Some students either may not notice any change in breathing or may ignore subtle signs of impending wheezing.

The lowest end of this zone (50 to 70 percent) is associated with obvious clinical signs of asthma. This precrisis zone indicates extreme asthmatic instability, requiring immediate medical attention.

If appropriate changes in medication are made, the student's asthma should be restabilized at the green zone.

**Red Zone**
**(Indicates emergency)**

When flow rates fall to or below the 50 percent level, the child faces an almost certain asthmatic crisis.

Immediate and aggressive intervention is critical.

## Peak Flow Meter

| Procedure | | Points to Remember |
|---|---|---|
| 1. | Determine the need for the student to use the peak flow meter at school by reviewing the physician's orders. | *Some students with asthma may not appear to be wheezing, even though they are in acute distress.* |
| 2. | Wash hands. | |
| 3. | Place the mouthpiece on the peak flow meter. | *Make sure that the pointer is on zero.* |
| 4. | Have the student stand up. | |
| 5. | Have the student hold the meter with the vent free. Fingers must not obstruct the slot. | *Hold the body of the meter cylinder parallel to the floor.* |
| 6. | Have the student place the mouthpiece on the tongue with lips around the outside of the mouthpiece. | |
| 7. | The student must inhale as deeply as possible. | |
| 8. | The student must blow out as hard and as fast as possible into the mouthpiece. Be sure that the lips form a tight seal. | *The student's exhaling will cause the marker to move up the meter. Note and record the measurement that registers on the meter.* |
| 9. | Replace the marker at zero. Repeat the procedure two more times for a total of three exhalations. | *Wait 15 seconds between each try.* |
| 10. | Record the best measurement. Compare this reading with the baseline data. | *Use comparison data to assess the respiratory status of the student. (See the "Asthma Care Zone System" on the previous page.* |
| 11. | Registered nurse determines the need for medication as authorized by the physician. | |
| 12. | Assess the condition of the student. | *Contact the lawful custodian and consult with the physician as needed.* |
| 13. | Record the findings from this procedure on the student's trend sheet in student health record. | |

14. Refer to the manufacturer's guide for cleaning and maintenance of the peak flow meter.[2]

**Peak Flow Meter**
Skills Checklist

Student's Name:_____

Person Trained:_____

Position:_____ Instructor:_____

| | | Demo | Return Demonstration | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Date | Date | Date | Date | Date | Date | Date |
| A. | States name and purpose of procedure | | | | | | | |
| B. | Preparation: | | | | | | | |
| 2. | Assembles peak flow meter | | | | | | | |
| 3. | Positions student appropriately | | | | | | | |
| C. | Identifies supplies: | | | | | | | |
| 2. | Peak flow chart (graph) | | | | | | | |
| 3. | Mouthpiece | | | | | | | |
| 4. | Range (zone) sheet | | | | | | | |
| 5. | Cleaning solution | | | | | | | |
| 6. | Soap and water | | | | | | | |
| D. | Procedure: | | | | | | | |
| 2. | Places mouthpiece on peak flow meter | | | | | | | |
| 3. | Places marker at zero | | | | | | | |
| 4. | Ensures student is holding meter properly (lips forming a | | | | | | | |
| 5. | Instructs student in deep inhalation | | | | | | | |
| 6. | Ensures student exhales properly into meter | | | | | | | |
| 7. | Replaces meter marker at zero | | | | | | | |
| 8. | Repeats procedure for a total of three exhalations | | | | | | | |
| 9. | Records best reading/compares with baseline data | | | | | | | |
| 10. | Reports to registered nurse for decisions on treatment | | | | | | | |
| 11. | Refers to manufacturers guide for cleaning and | | | | | | | |
| E. | Documentation | | | | | | | |
| 2. | Compares reading with baseline data | | | | | | | |
| 3. | Reports to registered nurse for decisions re: medication | | | | | | | |
| 4. | Properly cleans, maintains and stores equipment | | | | | | | |

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Checklist content reviewed by:

_____ _____

Parent/Lawful Custodian Date

## Inhaler

### I. Purpose

An inhaler delivers medication directly to the lungs. The inhaler is used when medication to open or dilate the bronchial tubes must be delivered directly to the lungs. The use of medication and the inhaler requires a physician's written authorization and this service must be reauthorized yearly by the prescribing physician or lawful custodian. The physician order must specify:

- Medication to be administered
- Number of puffs
- Frequency of use

Overuse or failure to appropriately use an inhaler can lead to:

- Reduced effectiveness of medication with overuse
- Asthmatic crisis which is a major medical emergency

The inhaler is used to improve breathing by administering medication directly into the lungs. To prevent an attack or to control an attack that has begun, a person with asthma can use an inhaler before exercising.

### II. Suggested Settings

An asthma inhaler should be made immediately available to a student with asthma wherever the student is located. It should always be available during off school campus activities. The inhaler is an essential piece of equipment that, when properly used, can prevent asthmatic crisis.

### III. Special Equipment

- Inhaler with tube (various brands are available).
- Prescribed medication
- Aerosol chamber or bubble reservoir if prescribed

### IV. Suggested Personnel and Training

An adult or the student with asthma, with competency-based training in appropriate techniques and problem management, can assist in administering the inhaler. Student cooperation is essential to effectiveness. It is important that students, if carrying an inhaler, be taught the effects of overuse and adult supervision is highly recommended as is careful documentation of use. The student can be taught to do his/her own documentation.

The school nurse should be very involved in the care of students with asthma and should provide periodic assessments of student health status as well as appropriate use with documentation.

The basic skills checklist included at the end of the procedure can be used as a foundation for competency-based training in appropriate techniques. It outlines specific procedures step-by-step.

Once the procedures have been mastered, the completed checklist serves as documentation of training.

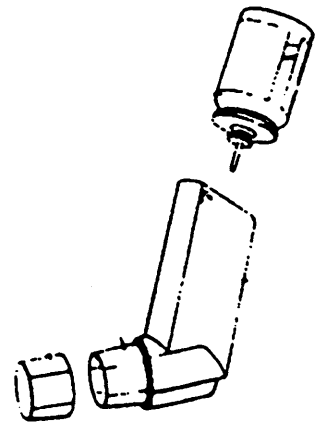
**Asthma Medication Procedures**
**Metered Dose Inhaler**

**Physician's Order**

Prior to administering a medication, a written physician's order is needed which documents:

- Medication to be administered
- Number of Puffs
- Frequency of use

Inhaler Parts/capsule
medication cartridge

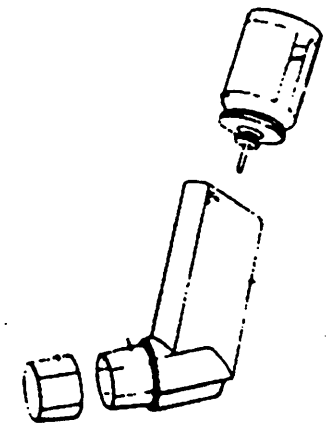


adapter

mouthpiece cap

mouthpiece

## Metered Dose Inhaler

| Procedure | Points to Remember |
|---|---|
| 1. Determine the need for student to use an inhaler at school by reviewing the physician's order and assessing student need prior to use. | *To get medication directly to the lungs, the technique with the inhaler must be correct. If the inhaler cannot be used correctly, an aerosol chamber or bubble reservoir may be attached to the inhaler. This method allows the medication to be held until the student is ready to breathe in.* |
| 2. Wash hands. | *medication cartridge*<br>  <br>adapter<br>mouthpiece cap mouthpiece |
| 3. Attach the inhaler to the spacer/adapter if necessary. | |
| 4. Shake the inhaler well. | *The right amount of medication may not spray out if the inhaler is not shaken well.* |
| 5. Have the student:<br>a. Hold the inhaler in one hand in an upright position. In the other hand hold the tube attached to the inhaler.<br>b. Breathe out to the end of a normal breath.<br>c. Place a tube in the mouth.<br>d. Tilt the head slightly back and start to breathe in *slowly*. | *The inhaler will stop spraying if it is held upside down. See the manufacturer's directions for the correct position.*<br><br>*Breathing in too fast makes most of the medicine stick in the mouth and throat rather than being delivered to the lungs.* |
| 6. Spray the inhaler at the *start* of a normal breath. | *If sprayed at the end of a breath, the medication will not work as well.* |
| 7. Breathe in as deeply as possible over 2 to 3 seconds. | |

8. Take the inhaler out of the mouth and hold the breath 8 to 10 seconds.

   a. Repeat the procedure if another puff is required.
   b. Record the use of the inhaler and medication on the student's medication record.

*Wait 5 to 10 minutes between puffs. Do not let the student take more puffs than directed by the physician.*

9. Determine the condition of the student based on the post treatment status.

*Contact the lawful custodian and consult with the physician as needed.*[4]

**Inhaler**
**Skills Checklist**

Student's Name:_____

Person Trained:_____

Position:_____ Instructor:_____

| | | Demo | Return Demonstration | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Date | Date | Date | Date | Date | Date | Date |
| A. | States name and purpose of procedure | | | | | | | |
| B. | Preparation | | | | | | | |
| | 1. Washes hands | | | | | | | |
| | 2. Assembles inhaler | | | | | | | |
| | 3. Positions student appropriately | | | | | | | |
| C. | Identifies supplies | | | | | | | |
| | 1. Inhaler | | | | | | | |
| | 2. Spacer or adapter | | | | | | | |
| D. | Procedure | | | | | | | |
| | 1. Shake inhaler well | | | | | | | |
| | 2. Instructs student in holding inhaler | | | | | | | |
| | 3. Observes appropriate placement of mouthpiece with lips forming tight seal and head tilt | | | | | | | |
| | 4. Ensures medication is sprayed at the START of a NORMAL breath | | | | | | | |
| | 5. Has student breathe in deeply and slowly over 2-3 seconds | | | | | | | |
| | 6. Has student remove inhaler and hold breath 8-10 seconds | | | | | | | |
| | 7. Repeats procedure if another puff is required | | | | | | | |
| | 8. Records use of inhaler and medication on student's medication record | | | | | | | |
| | 9. Contact lawful custodian if distress persists | | | | | | | |

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Checklist content reviewed by:

_____ _____

Parent/Lawful Custodian Date

## NOTES

1. Information on pages 1-5 of this section has been adapted from:

   National Institutes of Health. (1991)."Executive summary: Guidelines for the diagnosis and management of asthma," *National Asthma Education Program, Expert Panel Report.* U.S. Department of Health and Human Services, Public Health Service. (Publication No. 91-3042A). Washington, D.C.

   The American Association for Respiratory Care. "Peak Performance U.S.A.: A program for managing asthma in school."

2. Information on pages 6-10 of this section has been adapted from:

   U. S. Department of Education. (September, 1991). *Managing Asthma: A guide for schools,* p. 16.

3. Children's Hospital Chronic Illness Program, Ventilator Assisted Care Program. (1987). *Getting it started and keeping it going: A guide for respiratory home care of the ventilator assisted individual.* New Orleans, LA. Adapted by permission.

4. Information on pages 12-16 of this section has been adapted from:

   Keen, T., et. al. (1996). *Guidelines for Specialized Healthcare Procedures.* Virginia Department of Health. Richmond.

5. Children's Hospital Chronic Illness Program, Ventilator Assisted Care Program.